Qunfang Yao

Address: 18 Thomas St, , Sydney, NSW 2067, Tel: +61 491
Email: @gmail.com

EDUCATION

East China Normal University **Shanghai, China**

Master of Physical Electronics *Sept 2014 – Jun 2017*

- **GPA:** 3.53/4.0
- **Thesis:** First-principles Investigation on Rashba Spin-Orbit Coupling in Two-Dimensional Transition Metal Dichalcogenides
- **Courses:** Solid State Thoery, Current Semiconductor Physics, Methodology of Physical Electronics, Lectures of New Semiconductor Material, Ferroelectric Materials and devices, Nanoscale Devices

Wuhan University of Science and Technology **Wuhan, China**

Bachelor of Automation *Sept 2010 – Jun 2014*

- **GPA:** 3.41/4.0
- **Courses:** College Physics, Principle of Automatics Control, Digital Signal Processing, Analog Electronics Technology

RESEARCH INTEREST

My research interests are deeply rooted in Condensed Matter Theory, focusing on the intricate relationships and applications among topological phenomena, spin-orbit coupling, multiferroic materials, and two-dimensional (2D) materials.

PUBLICATIONS

1. **Qun-Fang Yao,** Jia Cai, Wen-Yi Tong, Shi-Jing Gong*, Ji-Qing Wang, Xiangang Wan, Chun-Gang Duan, J. H. Chu. *Manipulation of the large Rashba spin splitting in polar two-dimensional transition metal dichalcogenides*. **Phys. Rev. B** 95, 165401(2017).

- Engaged in advanced research on Rashba Spin-Orbit Coupling in polar two-dimensional transition-metal dichalcogenides , utilizing density functional theory calculations to examine the impact of in-plane biaxial strain on SOC characteristics.
- Found that intrinsic out-of-plane electric fields due to mirror symmetry breaking could induce significant Rashba spin splitting, which can be effectively tuned by applying in-plane biaxial strain.
- Demonstrated that a small strain (from -2% to 2%) could significantly tune the Rashba SOC by affecting the orbital overlap, which in turn modulates the intrinsic electric field.
- Explored the less effective influence of external electric fields on Rashba SOC compared to strain effects, contributing to foundational insights into semiconductor spintronics and valleytronics.

2. Shi-Jing Gong, Jia Cai, **Qun-Fang Yao**, Wen-Yi Tong, Xiangang Wan, Chun-Gang Duan*, and J. H. Chu. *Orbital control of Rashba spin orbit coupling in noble metal surfaces*. **J. Appl. Phys.** 119, 125310 (2016).

- Conducted groundbreaking research on Rashba Spin-Orbit Coupling (SOC) in noble metal surfaces
- Utilized density-functional theory (DFT) and the newly developed Orbital Selective External Potential (OSEP) method to investigate SOC in the Shockley surface states of Au(111) and Ag(111).
- Demonstrated the manipulation of Rashba SOC through external orbital potentials, enhancing understanding of electronic surface states influenced by *d*-orbitals, pivotal for spintronics.
- Achieved a deeper insight into the role of minor *d*-orbitals and their hybridization effects on SOC, leading to potential new methods for controlling electronic properties of metal films.

RESEARCH AND WORK EXPERIENCES

1. **Agricultural Bank of China Research and Development Center** **Shanghai, China**

Description: Distributed Core Personal Debt Business System *Jul 2017 – Aug 2023*

Technologies: JavaScript, Java, Spring Boot, RESTful API, MySQL, Oracle, C

- Developed a Cardless Payment System for UnionPay merchants, focusing on transaction limits and processing enhancements.
- Undertook a comprehensive refactoring of the core system for personal debit card liabilities, which included database migration from Oracle to MySQL, redesign of table structures, data migration strategies, and reorganization of business modules.
- Led the development of a Single Page Application (SPA) using HTML, CSS, and JavaScript
- Implemented RESTful APIs using Java (Spring Boot) to support an event-driven architecture
- Wrote unit tests for React components and backend controllers using Jest and JUnit
- Led a team of eight, overseeing project execution and management, which significantly enhanced overall team productivity and project turnaround times

2. **Key Laboratory of Polar Materials and Devices, Ministry of Education** **Shanghai, China**

Description: Investigated on Rashba Spin-Orbit Coupling(SOC) in Two-Dimensional Transition Metal Dichalcogenides

Advisor: Prof. Shi-Jing Gong, Prof. Chun-Gang Duan *Sept 2014 – Jun 2017*

- Investigated Rashba Spin-Orbit Coupling (SOC) in two-dimensional transition metal dichalcogenides by manipulating stress and electric fields. For details, please refer to the publication listed.
- Conducted studies on band calculation methods, specifically focusing on density functional theory (DFT) calculations.
- Acquired knowledge of tight-binding models and group theory analysis, enhancing theoretical understanding and computational skills.
- Acquired knowledge of ferroelectric and ferromagnetic materials, exploring their properties and applications in modern material science.

HONORS AND AWARDS

- Outstanding Employee, Agricultural Bank of China Research and Development Center, 2022
- Outstanding Wrangler Award, Agricultural Bank of China Research and Development Center, 2021
- Outstanding Graduate, East China Normal University, 2017
- Second Prize, 13th National Postgraduate Mathematical Modeling Competition, "Huawei Cup", 2016
- Outstanding Paper Award, Autumn Academic Conference, Chinese Physical Society, 2015

PROFESSIONAL SKILLS

- Programming Languages: Java, Python, C, C++
- Tools: VASP, Git, Visual Studio Code, Intellij IDEA
- System Maintenance: Linux